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are very young but do not seem to have been well preserved. If material in this stage and somewhat older stages could be secured, it would help immensely in comparing the Bennettitales and the Cycadales.—C. J. CHAMBERLAIN.

Cytology of the basidium.—A cytological investigation of the basidium of *Eocronartium muscicola*, one of the Auriculariales parasitic upon mosses, was undertaken by FITZPATRICK¹³ because he had noticed that the nuclei are of unusual size, and because very little cytological work has been done in this order. The mycelium, which is intracellular and extends throughout the host, is composed of binucleate cells. The cells of the sporophore are also binucleate, and, during division, it is seen that the number of chromosomes in each of the 2 nuclei is 4. During the development of the basidium, the 2 nuclei fuse, the resulting nucleus passes into synapsis, and in later stages of division shows 4 chromosomes, which is also the number at the second division, so that the total number of chromosomes in the cell is reduced. Toward the close of the second division a transverse wall appears in the middle of the basidium and is soon followed by two more walls, so that the basidium consists of a filament of 4 cells. The sterigmata, which are large in proportion to the cells from which they arise, are not quite simultaneous in their appearance. The chromatin becomes drawn out into a slender thread as the nuclei pass into the young spores, and there is no connection with the centrosomes, as has been reported for some basidia. How the binucleate mycelium arises from the uninucleate spore has not yet been determined.—C. J. CHAMBERLAIN.

Orientation of roots.—HOLMAN¹⁴ has investigated the influence of the medium upon the orientation of primary terrestrial roots. He shows that the failure of roots grown in air to reach a vertical position is due to lack of mechanical resistance to the advance of the root tip after the flattening of the primary geotropic curvature, rather than to differences in water content in the medium, or changes in geotropic sensitiveness, or to thigmotropism. His observations have been extended to secondary roots,¹⁵ and here also he finds that when they have been displaced from normal position with respect to gravity, and the first curvature of response has been flattened, mechanical resistance is necessary to a complete reaction to normal position. The mechanical resistance hinders flattening of the primary curvature of the root tip, and passively depresses the tip as it moves forward, thus reinforcing and completing the geotropic response.—C. A. SHULL.

¹³ FITZPATRICK, H. M., The cytology of *Eocronartium muscicola*. Amer. Jour. Bot. 5:397-419. pls. 30-32. 1918.

¹⁴ HOLMAN, RICHARD M., The orientation of primary terrestrial roots with particular reference to the medium in which they are grown. Amer. Jour. Bot. 3:274-318. 1916.

¹⁵ ———, Influence of the medium upon the orientation of secondary terrestrial roots. Amer. Jour. Bot. 3:407-414. 1916.